DEPARTMENT OF THE NAVY
OFFICE OF NAVAL RESEARCH
RESIDENT REPRESENTATIVE
UNIVERSITY OF WASHINGTON
410 UNIVERSITY DISTRICT BUILDING
1107 N.E. 45TH STREET
SEATTLE, WA 98105-4631

IN REPLY REFER TO:

425:RJS:ead
N00014-88-K-0045
15 January 19921

From: Office of Naval Research Resident Representative, Seattle
To: ONR Scientific Officer, Dr. Thomas B. Curtin, Code 1125AR, Arctic Sciences, Office of the Chief of Naval Research, Ballston Tower # 1, 800 North Quincy Street, Arlington, VA 22217-5000

Subj: REQUEST FOR FINAL TECHNICAL APPROVAL, CONTRACT N00014-88-K-0045; R&T PROJECT CODE: 4255048---06; THE UNIVERSITY OF WASHINGTON; PRINCIPAL INVESTIGATOR IS PROFESSOR ANDREAS HEIBERG, POLAR SCIENCE CENTER/APL

1. This office is in the process of closing subject contract. We have been advised that the final technical report has been submitted.

2. So that closeout may continue, please provide this office with information as to whether technical requirements have been performed satisfactorily.

Eleanor A. Dixon
ELEANOR A. DIXON
Procurement Assistant

cc:
DTIC (w/copy of final technical report)
********** DO NOT DETACH **********

FIRST ENDORSEMENT on ONR ltr., dtd. 15 January 1992

From: ONR Scientific Officer, Dr. Thomas B. Curtin, Code 1125AR

To: Office of Naval Research, Seattle

1. Returned for necessary action.

2. I certify that all technical requirements under subject contract are:

____ Satisfactory

____ Unsatisfactory

____ Comments:

_____ Date

_____ Scientific Officer

FINAL REPORT

ARCTIC SCIENCE SUPPORT
UNDER
ONR CONTRACT N00014-88-K-0045

A. Heiberg

Polar Science Center, Applied Physics Laboratory
College of Ocean and Fishery Sciences, University of Washington

OBJECTIVES

The objective of our work under this contract was to assist the Office of Naval Research in implementing their research goals in the Arctic. Our primary obligations were to provide logistical support for a major field experiment, CEAREX, involving University of Washington and other U.S. and foreign investigators and to prepare for a second major field program, LeadEx.

These obligations involved assuming major responsibilities in the planning, coordination, and management of the field programs. These responsibilities included procuring logistical and scientific equipment and supplies, contracting for support services such as ships and aircraft, and hiring temporary personnel for support in the field.

ACCOMPLISHMENTS

CEAREX

The main activity during this contract period was support of the Coordinated Eastern Arctic Research Experiment (CEAREX). This major field program was staged from northern Norway and carried out in the Fram Strait region from August 1988 to June 1989. The objectives were to study the following mechanisms:

- heat, mass, and momentum fluxes in the upper ocean
- heat, moisture, and momentum fluxes in the atmosphere
- air–ice–ocean stress divergence
- ambient noise generation, scattering, and absorption.

The experiment was divided into three phases. Phase one involved ship-based research from an ice-strengthened Norwegian research vessel, the *Polar Bjorn*. The ship was allowed to freeze into the polar ice pack in the fall of 1998 and passively drifted with the moving ice until breaking out in January 1989, five months later.

In phase two, February 1989, the same ship, now with an onboard helicopter, supported studies in the marginal ice zone (MIZ) north and west of the Svalbard Archipelago.

Phase three started in early March. The *Polar Bjorn* continued to provide support for MIZ studies in Fram Strait while complementary research was carried out from two temporary stations established on the drifting sea ice. One was a 25-person camp 300 miles north of Longyearbyen on Spitsbergen Island, and the other was an 18-person camp 250 miles west of Longyearbyen.

With its ambitious objectives and wide participation, this 19-month field program offered many new and demanding challenges. Nevertheless, the operation was carried out close to plan, within budget, and on schedule—a major accomplishment. One research ship and two ice camps provided support for more than 6000 personnel-days of scientific research. A wealth of new information was gathered, and everyone returned home safely.

LEADEX

A second major field program, the Lead Experiment (LeadEx), is scheduled north of Deadhorse, Alaska, in April 1992. The main objective is to collect data on modification of the atmospheric and oceanographic boundary layer at and in the vicinity of open and refreezing leads. During the contract period, various operational tactics were evaluated, and a consensus was reached on the approach to be taken.

A base camp will be established on a suitable ice floe 100–200 miles off the coast of Alaska. Approximately 35 investigators and support personnel, with all equipment, will be deployed to this site by fixed-wing aircraft. The investigators will have special-purpose lightweight shelters, which will be erected and outfitted at the base camp as autonomous laboratories/living huts. These huts will be lifted by helicopter to the edge of a newly formed lead, when one develops in the base camp's vicinity. The goal is to sample leads forming up to 30 miles from the base camp, and the hut weight restrictions have been set accordingly. Two helicopters are planned: a larger one to move the laboratory/living huts between the base camp and the leads, and a second, smaller helicopter to move personnel and lighter equipment in the meantime.

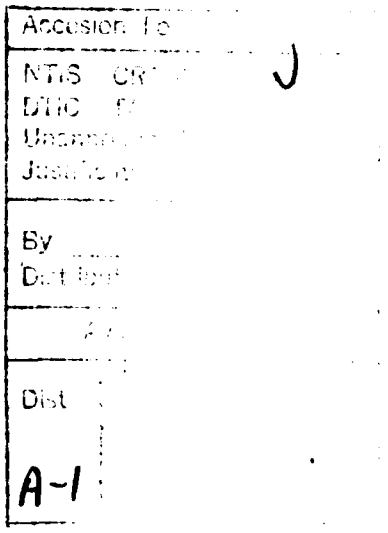
The rapidly changing ice conditions and the quickly freezing water demand extra care in planning, with special attention to safety. By the time a lead has been spotted, and the personnel and equipment have been set up at the site, there might already be a substantial ice cover on the lead, and the important initial phase of the freeze-over will have already occurred. Reliable and proven equipment, efficient procedures, and proper prioritizing will be key factors affecting the results. In view of this, a pilot study was deemed necessary to test the quipment and sampling techniques and deployment and logistics procedures. The pilot study was carried out during April 1991 at an ice camp established

200 miles north of Deadhorse, Alaska. This field trip was judged invaluable in preparing for the 1992 experiment.

After participants returned from the pilot study, preparations continued for the 1992 experiment, under this contract through June 1991 and subsequently under Grant N00014-91-J-1665.

OTHER

Under this contract, we have maintained a substantial pool of oceanographic and logistics equipment for use by ONR-sponsored investigators. This effort will continue under Grant N00014-91-J-1665.



Statement A per telecon Dr. Thomas Curtin
ONR/ Code 1125
Arlington, VA 22217-5000

NWW 1/27/92